Using A Resonator

Figure 3.16 The Doble Resonator

The Doble Type C Resonating Inductor is an iron-core reactor with an adjustable air gap, capable of resonating capacitances within a range of 0.05 to 1.0 microfarads at 60 Hz, and a range of 0.07-1.4 at 50 Hz. It is designed to extend the current range of Doble 10 kV Power-Factor Test Sets up to four Amps, assuming a lossless specimen, at voltages up to 10 kV. It extends the use of the set for testing relatively long cable lengths, large rotating machines, and other high-capacitance specimens. The ultimate range of the resonator depends not only on the capacitance of the specimen but also the total losses of the specimen under test.

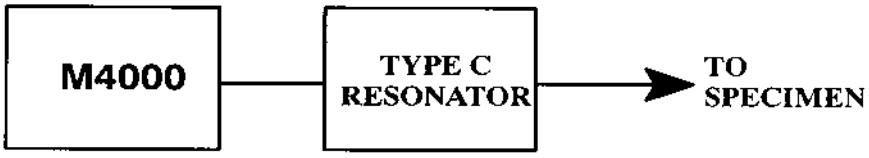

Figure 3.17 Power-Factor Test Set and Type C Resonating Inductor

The Resonator, shown schematically in Figure 3.18, is contained in a metal housing measuring 24 x 17 x 15 inches, and weighs approximately 185 pounds.

NOTE

L adjustable from 7 to 140 Henries @60Hz.

Counter dial calibrated per calibration chart supplied with each unit.

Resonator chassis ground connected to test ground through cable shield or external test ground lead.

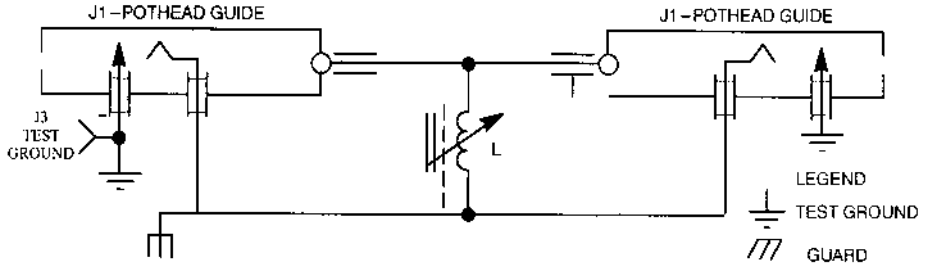

Figure 3.18 Schematic of Type C Resonating Inductor

Operating Procedure of Type C Resonating Inductor

The Resonator is connected to the M4100 Instrument by means of an 8-ft,10 kV jumper cable. The regular 10 kV test cable is connected between the Resonator and the test specimen. Cable receptacles will be found in the rear of the Resonator case and can be used interchangeably (see Figure 3.18).

The Resonator is equipped with a core-clamping arrangement to reduce the noise level when the Resonator is in use, and more importantly, to minimize vibration. A speeder-type wrench is provided for use with this clamping arrangement and for use in tuning the Resonator. The clamping adjustment is located in the front vertical face of the Resonator while the tuning control is located in the top panel. Turning the clamping adjustment approximately 180° counterclockwise or clockwise will either unclamp or clamp the core, respectively.

If the equivalent 10 kV charging current of the test specimen is known, the Resonator may be set approximately by adjusting the tuning control until the counter setting corresponds to this current. Mounted on the Resonator panel is a reference chart relating the approximate counter reading to the specimen current.

Accurate tuning of the Resonator is obtained by turning the tuning control until the current taken from the 120 volt supply is a minimum. To do this in the Clipboard test mode, follow this procedure:

1. Set the test for Line Sync Reversal (Under the LC column, select C).
2. Connect the M4000, the resonator, and the specimen as shown in Figure 3.17
3. Select the "System" tab from the "Tools/Configuration" menu of the M4000.
4. Set the M4000 to the "Manual Set Voltage" Ramp Mode.

NOTE

Do not raise the test voltage beyond the allowed limit for the attached specimen.

5. Unclamp the Resonator Core.
6. Raise the test voltage to about 2 kV, using the Page Up (fast) or Up Arrow (slow) keys.
7. Observe the "input current" in the "Test Results" box.
8. Tune the Resonator until the "input current" of the M4000 is at a minimum.
9. To fine tune, raise the voltage to the final test voltage, or as close to it as possible, and repeat steps 7 and 8.
10. Reclamp the Resonator core.
11. Lower the voltage. The Resonator is tuned and you are ready to enter information on the row in the clipboard you are using for the test.
12. When filling in the clipboard row prior to starting the test, remember to select one of the "Line Sync Reversal" choices, C or F, in the LC (Line Configuration) column. For a description of all the Line Configuration choices, see "Glossary", in the "Contents" selection of the M4000 "Help" menu.
13. When finished using the Resonator, you may wish to return to *Tools/ Configuration* and return the M4000 to its original settings of "Auto. Ramp Voltage" Ramp Mode in the *System* Configuration.

Due to the high currents involved requiring the use of the Resonator, the 120 volt supply cord to the M4100 should be of relatively large wire gauge in order to minimize the line voltage drop.